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ABSTRACT

A statewide effort was conducted in Kentucky to design a longitudinal assessment of tech prep, an educational reform strategy for high schools. Construction of the evaluation design included consideration of quantitative and qualitative data for school programmatic decisions, as well as funding accountability requirements at the district and state levels. The study found that the success of tech prep depended on the following elements: staff development, curriculum integration, secondary-postsecondary linkages, academic rigor for all students, and community and work-based learning. Lessons learned from the state's 5-year assessment experience with a model that aligns a specific program (tech prep) with state reform can help school administrators connect goals, strategies, and assessment of various program initiatives. (The report contains 27 references and study documents, including a matrix showing the alignment of tech prep goals and strategies with Kentucky education reform goals.) (KC)

KENTUCKY'S TECH PREP EVALUATION SYSTEM: A FIVE-YEAR REVIEW

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A FIVE-YEAR LOOK AT KENTUCKY'S TECH PREP PROGRAM: A SYSTEMIC EVALUATION MODEL

Educational reform of the1990s altered the nature of school change from refocus to restructure. Historically, schools have shifted focus from one new idea (or an "old" idea in new verbiage) to another in an attempt to serve the needs of students and to adjust to societal, economic, and political pressures. Programs and innovations come and go; some of these changes leave a mark that influences schools over time; others disappear and sometimes leave teachers and administrators with an attitude toward change efforts that "this, too, shall pass away." Educational change in the decade of the 1990s became a systemic effort to re-examine and restructure not only the educational process but the whole idea of what schools are about, how the delivery system should be structured, how it should be financed, who should make decisions, and how to make schools accountable for student achievement.

Dominant themes of reform have emerged throughout the country; i.e., educational equity and high achievement for all students, empowerment of stakeholders, and accountability for standards-based outcomes. State legislatures and federal legislation define the parameters for educational systems, and state departments of education and school districts design curriculum and policy frameworks. However, decisions about programs, instructional strategies, and educational innovations (as well as combinations and variations of these) for particular schools are in the hands of local school stakeholders. This reform vision for schools calls for a collaborative effort at the school level to address the diverse learning needs of students through the selection, implementation, and evaluation of instructional strategies and programs.

With systemic school restructuring that converges on outcomes, the need for curriculum alignment to achieve learning goals becomes apparent. This article describes a statewide effort in Kentucky to design a longitudinal assessment of a specific secondary education programmatic concept, Tech Prep, that aligns with the broader purposes, goals, themes, and strategies of educational reform. Construction of this evaluation design included consideration of quantitative and qualitative data for school programmatic decisions, as well as funding accountability requirements at the district and state levels. The conclusion of the article shares lessons learned through a five-year history with this assessment model and proposes modifications for adaptability of the model to other school improvement innovations and programs.

A Framework of Education Reform for High Schools

Restructuring schools means rethinking and redesigning what schools do and what they can be—the substance of teaching and learning and the structure for educational delivery (Conley & Goldman, 1995). The restructuring task for schools is to create an organizational structure that builds collective staff and student responsibility for learning and promotes cooperative and collaborative work to accomplish the school's mission (Newmann & Wehlage, 1995, p. 30).

High schools present the greatest challenge in a collaborative reframing of instruction to support high achievement and continued learning for all students. Traditionally, secondary schools operate in a fragmented manner that track students into programs based on perceived abilities (O'Neil, 1994). At best, departmental structures by subject content are loosely coupled and operate in relative isolation from one another.

Further fragmentation occurred with the separation of academic content areas from vocational programs. Historically, vocational funding contributed to this separation by making resources for staff development, equipment, and materials available for exclusive use of vocational programs and requiring longer blocks of class time and smaller class sizes. In some schools, administrators and academic teachers resented these differences. Vocational education placed importance on hands-on, active learning experiences that prepared for work. Consequently, vocational students often were perceived as able to work with their hands but not their heads—these students were expected to move directly from high school to the workforce and were considered unlikely candidates for higher education.

Fragmentation occurred even within academic subject areas. In courses such as mathematics, science, and language arts that were required of all students, schools categorized content offerings as general courses and upper-level courses. This separation of students into algebra or general mathematics and chemistry or general science sorted students by ability or academic achievements.

Federal legislation, America 2000 (1991) and Goals 2000—Educate America Act (1994), challenged these traditional practices by committing the nation to school improvement that would prepare all students for continued learning, responsible citizenship, and productive employment. The basic strategy of this legislation is systemic reform based on agreed-upon educational goals and standards at each governance level (Stedman, 1994). National goals articulated an educational vision, but it was left to states and local schools to transform that vision from rhetoric to reality.

Concurrent with the emergence of major reforms in the nation's schools, federal legislation was reshaping vocational education in a manner that reflected the same basic school reform themes (McCracken, 1991). The Carl D. Perkins Vocational and Applied Technology Act, Amendments of 1990, required (1) integrated vocational and academic education, (2) improvements in student academic performance, (3) extensive career planning and preparation at the secondary level, and (4) advanced technical skills at the post-secondary level. This legislation sets a new direction for improving vocational education in the high schools and helps to bring vocational education into the mainstream of reform and the improvement of education in general (Wirt, 1991).

At the same time, Part IIIE of this 1990 vocational legislation made funds available to states for a new program initiative titled Tech Prep. Tech Prep is intended to integrate vocational subjects with rigorous academics and to articulate secondary and post-secondary education based on career clusters (Bragg, et al., 1997). The Tech Prep programs were not only challenged to include academic content in vocational offerings, but also Tech Prep students were required to complete higher-level academic courses. Further, this new program linked higher education and advanced technical education to both secondary education and the workplace (Urquiola, et al., 1997). Students begin planning and working toward a post-secondary credential in a specified field while still in high school (Ruhland, 1995). Tech Prep changed the approach of high school vocational education from preparation for entry-level employment to a first step in preparation for continued learning and instruction (p. 23).

Funding opportunities for Tech Prep occurred at a time when states were undertaking comprehensive educational reform. Tech Prep's applied learning and

student-centered educational strategies provided a model for raising the achievement of all students. Instead of separating and tracking into general academic courses those vocational students deemed academically untalented or noncollege-bound, these students were now expected to meet the same high academic standards as "college prep" students (Urquiola, et al., 1997, p. 23). The intent of Tech Prep matches the over-arching tenet of educational reform that all students can achieve at high levels and that student learning is enhanced when linked with real-world applications.

In 1987 Kentucky became a charter member in the High Schools That Work (HSTW) vocational education consortium launched by the Southern Regional Education Board (SREB). The consortium aimed to make vocational education a full partner in improving high school students' academic skills. A major goal of HSTW was to increase the mathematics, science, and communication achievement of students in general and vocational programs to the national average by the year 2000 (Bottoms, Presson, & Johnson, 1992). Key practices implemented by schools as a part of HSTW made a connection between abstract academic studies and actual problems, tasks, and situations in the workplace.

When Tech Prep funds became available, Kentucky already had a successful track record of academic-vocational integration with the two high schools that were charter members of the HSTW initiative. Tech Prep components matched well with HSTW practices, and these components were readily embraced by Kentucky high schools. The Kentucky Educational Reform Act (KERA) was just getting underway, and high schools were seeking innovative ways to meet the educational reform challenge that all students can learn and achieve high standards.

Kentucky's Tech Prep Partnership with KERA

Kentucky was one of the first states to initiate comprehensive school reform. The Kentucky Education Reform Act (Kentucky Revised Statute, 1990), better known as KERA, legislated systemic change in funding, structure, and instructional practices. Although the initial restructuring target of KERA created non-graded primary units in elementary schools, secondary schools were expected to restructure education to match KERA instructional themes and learning expectations. KERA legislation charged the State Board for Elementary and Secondary Education with reviewing graduation requirements to assure consistency with new learning expectations. A High School Restructuring Task Force was appointed to carry out this mandate. This Task Force was asked to identify new paradigms for a restructured high school that would enhance student performance, increase the graduation rate, and assure a successful transition for all students from high school to work, the military, or post-secondary education (Task Force on High School Restructuring, 1993).

With high school restructuring on the KERA agenda and Kentucky high schools searching for restructuring models, the Tech Prep programmatic design became one vehicle for revamping the secondary curriculum. From the beginning, local school personnel recognized that Tech Prep could help high schools implement mandated school reform (Logan & Zirkle, 1998):

> Tech Prep served as a guide for us in the early KERA years at a time when we are [sic] asked to reform but were not given any specific instructional vehicles by which to reform our institution (p.5).

> Tech Prep has been a major component in refocusing the direction for the . . .school system. It has provided the teachers with many resources to link the education and business community together for a common focus (p. 4).

Table 1 aligns Tech Prep goals and strategies with learning goals of the Kentucky Education Reform Act. Tech Prep, through upgrading course work and experiences for vocational students and students formerly in a high school general track, contributes to the underlying theme of KERA for high expectations for all students.

INSERT TABLE 1

A Programmatic Evaluation Model

The fact that Tech Prep mirrored many of the goals and strategies of KERA was no accident. From the beginning, Kentucky's Tech Prep program aimed not only to satisfy required components from federal vocational legislation but also to support and enhance a high school's reformation in accordance with KERA's goals, learning strategies, and accountability measures. The first year of Tech Prep funding for Kentucky schools was 1991-92. First-year Tech Prep funding supports a planning year. Therefore, the first Kentucky students enrolled in Tech Prep in school year 1992-1993.

In 1993 the Kentucky Department for Technical Education and the Kentucky Department of Education funded a project to create a statewide Tech Prep evaluation system that included a computerized database. The primary purpose of the database was to collect data to help measure the success of Tech Prep in paralleling and supporting major themes of KERA and high school restructuring. Working in partnership with the University of Louisville, the University of Kentucky Institute on Education Reform,

contracted to design and field test a Tech Prep evaluation system and database. Because school principals and state officials often find themselves with little, if any, quantitative data for evaluation of program outcomes, the Tech Prep evaluation system was to be a source of school and statewide quantitative data. These data were to present both a snapshot with which to assess Tech Prep activity for each operational year and a longitudinal portrait with which to analyze trends and document long-term results.

Design of the Evaluation Model

Two documents published in 1993 by different sources affected the specific design of the Kentucky Tech Prep database and the data collection instruments. First, Kentucky's Task Force on High School Restructuring produced a report recommending core components for each student's high school experience. Second, the U.S. Office of Education contracted with Mathematica Policy Research, Inc., to gather national data from Tech Prep consortia; i.e., groups of schools organized to collaborate in the implementation and support of Tech Prep programs. The national study was not designed to collect data on Tech Prep's impact on student achievement. Rather, it was intended to assess the effectiveness of those structural approaches with the most promise to strengthen student achievement that would lead to a rewarding career (Hershey, Silverberg, Owens, Hulsey, 1998, p. 11).

Kentucky's Tech Prep evaluation system addressed perceptions and outcomes of Tech Prep programs that were consistent with expectations of education reform and high school restructuring in the state. The Restructuring Task Force report recommended five core components: (a) an individual graduation plan developed prior to high school entry and updated annually that outlined a planned program of study in preparation for college, vocational/technical school, the workforce, and military or community service, (b) an integrated academic portfolio for each student that demonstrated attainment of KERA goals and expectations, (c) a senior culminating project, (d) participation for at least one year in service learning, school service, work-based learning, or student-initiated enrichment, and (e) a graduation exit review for achievement verification of KERA goals and learner expectations (Task Force on High School Restructuring Task Force, 1993).

The initial design of the Kentucky data collection instrument was heavily influenced by the national Tech Prep evaluation instrument in an attempt to prevent duplicative reporting by local schools. The national assessment proposed a five-year evaluation, and the Kentucky Tech Prep evaluation was to set up an on-going system of data collection and analysis. Because Kentucky's educational reform placed accountability for results at the school level, the state's Tech Prep evaluation unit was school-based rather than consortium-level. The format for Kentucky's school survey instrument was patterned after the national consortia instrument to allow consortium summarization for those schools that were part of a consortium. The completed state evaluation instrument for these schools was to be sent to their consortium coordinator who would summarize school data to complete the national evaluation instrument and then forward their school surveys to the state.

The state Tech Prep evaluation system also avoided duplicate collection of KERA accountability data. The Tech Prep school instrument did not ask for KERA accountability data that had already been collected by the Kentucky Department of Education. Copies of transition data and statewide test results were obtained from the Department of Education.

Selection of variables for the Kentucky evaluation of Tech Prep came from a review of (a) proposals for restructuring high schools, (b) the national Tech Prep evaluation survey instrument; (c) KERA expectations, strategies, and accountability data; and (d) Tech Prep goals listed in the state funding application guidelines. University project directors worked with Tech Prep state department personnel to develop and refine the data collection process and the school survey instrument. Assessment variables included staff development, Tech Prep core elements, student characteristics, community service and work-based learning, secondary and post-secondary articulation, transition data for Tech Prep graduates, and school-level change factors. Figure 1 shows the Tech Prep evaluation data variables aligned with reform goals and high school restructuring.

INSERT FIGURE 1

Pilot Study and Initial Data Collection

Two data collection instruments were developed—one for secondary Tech Prep programs and one for post-secondary Tech Prep partners. Definitions of terms used in the instruments were developed to accompany the state data collection instrument. The national survey instrument did not provide a definition of Tech Prep students, thereby, leaving this definition to states or consortia. A Tech Prep student in Kentucky was

defined as one who develops an individualized career plan that links a secondary and post-secondary program of study for a particular occupational area.

The Kentucky data collection instruments were piloted in five schools across the state. After schools received the national survey instrument in the fall of 1993, the Kentucky evaluation instruments were distributed at meetings held with Tech Prep Coordinators. The university-based evaluation project directors met with Tech Prep Coordinators to explain the evaluation system and to clarify directions for completion of the state and national evaluation instruments. The Tech Prep Coordinator in each high school completed the secondary school survey and contacted post-secondary partners to complete of the post-secondary instrument.

Only high schools with at least one full year of Tech Prep program operation completed the evaluation instruments. In the evaluation design year, this meant that those programs funded for school year 1991-1992 received an evaluation instrument in the fall of 1993 to capture data on the 1992-1993 school year (the first year that Kentucky schools enrolled Tech Prep students). These data were entered in the statewide database and used to generate reports for each high school and a cumulative summary for the state.

Refinement of the Evaluation Model

State Tech Prep personnel and the evaluation project coordinators reviewed the 1993 data to refine the data collection instrument. A number of items were deleted that were initially included to correspond to the national survey instrument. The national instrument changed after the first year; therefore, it was not feasible to collect data for state and national instruments at the same time. Items from the national instrument were eliminated from the state instrument unless they were pertinent to Kentucky's assessment

Collection of data from post-secondary institutions proved to be impractical and duplicative since most of these colleges and schools served multiple high schools and ended up completing multiple evaluation instruments. Relevant data about post-secondary partners was henceforth included on the secondary instrument with additional data about students at the post-secondary level obtained from the state Council on Post-secondary Education.

In the fall of 1994 and each year thereafter the same data collection instrument has been used for the state Tech Prep database. After the first reporting year, Tech Prep Coordinators updated a computer printout of the school's previous year's report. Only new programs filled out an initial evaluation instrument. Thus, data for the 1993-1994 school year (collected in fall 1994) was the first year of four years of a longitudinal comparison of Tech Prep results with KERA and high school restructuring goals. Data from the 1993 survey were summarized and reported as the baseline. However, this report reflected only one year of Tech Prep operation; therefore, there were no program completers, and a number of survey items were not applicable that first year.

Tech Prep's Contribution to Educational Reform

The Kentucky database makes Tech Prep accountability data available for summary reports to legislators, vocational teachers, school administrators, and the general public. This section of the article describes what Kentucky has learned about Tech Prep's contribution to KERA and how Tech Prep in the state compares with results reported from the national Tech Prep evaluation (Hershey, Silverberg, Owens, & Hulsey, 1998). The Kentucky Tech Prep measures to support school reform illustrate how program assessment can support broader school, district, state, and national goals.

Alignment of goals and evaluation reduces redundant data collection and promotes collaborative rather than fragmented efforts for school improvement. Kentucky's Tech Prep evaluation results are compared to findings from the final report of the national Tech Prep evaluation

Academic-Vocational Integration

KERA learning goals call for applying mathematics and communication skills and core concepts from all subject areas to life situations and for connecting and integrating student experiences and knowledge. Accomplishment of these goals requires sharing of information and collaborative working relationships among all faculty and staff within a school. Tech Prep's programmatic contribution to these goals comes through staff development activities, teacher collaboration, and integration of academic and vocational education.

Staff Development. Tech Prep staff development activities over the past five years have promoted collaborative relationships for academic-vocational curricular integration within local schools. Most participants in these activities are academic teachers, with the numbers holding steady over a four-year period at a ratio of academic to vocational teachers of about 3:1. Participants in Tech Prep-funded staff development per school per year have averaged 18 to 21 academic teachers and 6 to 7 vocational teachers. An average of 2 to 3 school administrators and 2 counselors from each school have participated in Tech Prep staff development, along with an average of 2 to 4 representatives from the local business community.

Figure 2 displays five areas of major staff development reported most often by Tech Prep Coordinators. Academic-vocational education integration was identified by

the highest percentage of all sites for 1996-1997 and by 90% or more of schools in other years. For the last two reporting years, curriculum development ranked higher than previously. Activities to promote understanding of Tech Prep moved down in the list. Emphasis on program promotion appears to decrease after about two years of operation. Programs continuing into their third year, therefore, are able to shift staff development emphasis to curriculum changes. Both Tech Prep and vocational education legislation mandate integration of academic-vocational education. Because of the legislative requirement and because of the match with KERA's emphasis on knowledge integration, it is not surprising that academic-vocational linkages continue to be emphasized. These results are consistent with the 1998 national Tech Prep study findings that show new lines of communication and cooperation as a Tech Prep outcome and that Tech Prep has mobilized curriculum change (Hershey, Silverberg, Owens, & Hulsey, 1998, p. xix). Improved career counseling and a growing involvement of the business community also reflect strengths reported by the national Tech Prep study.

INSERT FIGURE 2 – STAFF DEVELOPMENT EMPHASES

The types of staff development activities rated as very helpful or extremely helpful include the annual state Tech Prep conference, small group working sessions at the local level, state staff technical assistance, and applied course workshops. Applied course workshops have been a consistent state-level staff development activity. To date, over 90 state workshops have helped teachers integrate academic classes with applied learning. School teams comprised of both academic and vocational teachers attend these workshops.

When asked each year to identify Tech Prep's most successful accomplishments, Tech Prep Coordinators placed collaboration of vocational and academic teachers at the top of the list three out of four years. Administrative support ranked second for these three years. The 1993-1994 and 1994-1995 survey results showed integration of Tech Prep with educational reform tied for a first- or second-place ranking. Figure 3 shows successful Tech Prep elements that ranked in the top five over the past four years. Clearly, administrative support, collaboration, and integration with educational reform were important elements in Tech Prep implementation in Kentucky high schools.

INSERT FIGURE 3—RANKING OF SUCCESSFUL ELEMENTS

Curriculum Integration. Integrating academic and vocational education is a twofold process: First, academic instruction becomes more applied and uses career interests to make mathematics, science, and English less abstract and more relevant to future work. At the same time, occupational courses incorporate more academic competencies (Hershey, Silverberg, Owens, & Hulsey, 1998, p. 5). Kentucky Tech Prep implemented integrated career applications into academic subject content both through applied courses and the integration of career applications into regular academic courses. Initially, the number of applied academic course sections showed increases each year and exceeded the number of sections integrated academic courses. By 1996-1997, however, the statewide average per school of integrated class sections was approximately four times the number of separate applied courses. This change is consistent with the state's educational reform goal of knowledge application to life situations for all subject areas.

The national Tech Prep study also found that schools are increasingly choosing to build applied content into a wide range of classes and dropping the use of the term

"applied" classes (Hershey, Silverberg, Owens, & Hulsey, 1998). This trend avoids separation of Tech Prep students from other students in their academic coursework. The national Tech Prep report recommends a structured program of study that groups students together for a vocational class and at least one key academic class in the belief that this separation promotes Tech Prep program cohesiveness. This recommendation appears inconsistent with Kentucky's reform goal for collaboration and knowledge integration, as well as the decrease in the number of separate applied courses for Tech Prep students.

Secondary-Post-Secondary Linkages

A key element of Tech Prep is the linkage of secondary education to further post-secondary education. Therefore, the percentage of graduates from the Tech Prep secondary program that enroll in a post-secondary extension of that program is an essential national, state, and local measure of program success.

Essential Elements. Tech Prep emphasizes linkages between secondary and post-secondary education as a means to improve both technical and basic academic skills. This component of the program intends to increase students' motivation to pursue education beyond high school and, thereby, to improve opportunities for career success in a rapidly changing, technological workplace (Hershey, Silverberg, Owens, & Hulsey, 1998). Four of the seven federal legislation requirements for Tech-Prep funding described secondary and post-secondary linkages: (a) articulation agreements; (b) a common core of mathematics, science, communication, and technology courses in the last two years of high school that lead to two years of advanced and specialized post-secondary courses; (c) a Tech-Prep curriculum design that encompasses coordinated secondary and post-secondary program elements; and (d) joint staff development for secondary and post-

secondary faculty to promote cooperation and curriculum continuity (Hershey, Silverberg, Owens, & Hulsey, 1998, pp. 7-8). The other three required elements require career counseling, student services, and access for special populations.

For program funding approval, Kentucky requires each Tech Prep program to have at least one secondary and post-secondary partnership. A written articulation agreement formalizes the terms of this partnership. The agreement serves as a basis for curriculum review and modification that reduce content duplication and incorporate advanced skills at the post-secondary level. Granting post-secondary credit for at least part of the secondary phase may be part of the articulation agreement.

Kentucky's 1993-1994 Tech Prep evaluation showed that a higher percentage of post-secondary coordinators believed administrative support to be the most successful aspect of the program. However, articulation agreements became the most successful Tech Prep element for the next three years. At the post-secondary level, administrative support moved to second place for 1994-1995 and 1995-1996 and third place by 1996-97. These data indicate the importance of administrative support, particularly in the beginning of new program implementation. Other Tech Prep components considered most successful at the post-secondary level were vocational and academic teacher collaboration, clear Tech Prep guidelines and objectives, and state involvement and support. Secondary and post-secondary teacher collaboration was listed in the top four for the first time on the 1996-1997 evaluation. Secondary Tech Prep programs begin individualized career planning in the eighth grade, therefore, the first Tech Prep students (those who entered the program in 1992-1993) were the first group to complete the secondary phase with access to all Tech Prep components. These graduates were ready

to enter the post-secondary level in 1996-1997. Therefore, it is reasonable that 1996-1997 was the year that teacher collaboration between the two levels became most important to post-secondary programs.

Kentucky evaluation results support the national study's conclusion that Tech Prep has opened new lines of communication and cooperation between academic and vocational teachers and between secondary and post-secondary institutions. The national report, however, did not mention the importance of administrative support as a successful element of Tech Prep implementation. Administrative support was mentioned frequently on the Kentucky evaluation at the top of the list for both the secondary and post-secondary levels.

Post-secondary Enrollments. The national evaluation (Hershey, Silverberg, Owens, & Hulsey, 1998, p.113) found that Tech-Prep implementation strengthened general messages to students about the value of post-secondary education and that more than half of Tech-Prep graduates go directly to post-secondary education or training. In 1995, national figures of Tech Prep high school graduates showed 58% going into post-secondary education, with more than half (55%) of this post-secondary enrollment taking place in community and technical colleges. For this same year, 58% of Kentucky Tech Prep graduates enrolled in post-secondary education. In Kentucky, the highest percentage of this group (47%) enrolled in four-year colleges or universities, while 38% went to community or technical colleges. The remaining graduates who entered post-secondary education went to registered apprenticeship, military schools, or private post-secondary institutions. The next two years reflected the same pattern. This difference between national and Kentucky results is not surprising, however. Tech Prep articulation

agreements in Kentucky are frequently developed between high schools and four-year state regional universities, as well as with community colleges and technical schools.

Sixty-one percent of Kentucky Tech Prep graduates entered post-secondary education in 1995-1996 with 52% of these students moving into higher education at four-year colleges or universities and 37% in two-year community or technical colleges. The 1996-1997 evaluation results showed fewer Tech Prep graduates enrolling in post-secondary education (48%), with 49% of these students going to four-year colleges or universities and 43% to community or technical colleges. For 1996-1997, however, the percentage of Tech Prep students shown as "unknown status" on the follow-up data increased to 12%. Only 2% were listed as unknown on the 1993-1994 evaluation. This percentage has increased each succeeding year. The next year this percentage increased to 5% and to 7% the third year. This increasing lack of follow-up information on graduates is a cause for concern and should be addressed. KERA's emphasis on success for all students makes it imperative that Tech Prep not lose track of students who may need additional help to make a positive transition from high school to further education or productive employment. Graduate follow up should be intensified to reduce the percentage of students who are listed as "unknown" when they leave high school.

The percentage of graduates unemployed and not in post-secondary education has remained about the same (4 to 5%). Although Tech Prep has been moderately successful in encouraging students to go on for further education after high school, this static percentage suggests that some Tech Prep students continue to leave high school without employment or transition to higher education. Additional research should be carried out to identify unmet needs of these Tech Prep students.

Academic Rigor for All Students

KERA is based on the premise that all students can learn and achieve at high levels. When it comes to expectations for high achievement, there can be no "forgotten half," a term often used to designate students originally targeted by Tech Prep legislation (Parnell, 1985; William T. Grant Foundation, 1988). Boysen (1992), the first Kentucky Commissioner of Education hired to implement KERA, listed 5 changes for shaping successful schools (p.6): (1) an individual plan completed by each student with the help of career counselors by the end of the 9th grade that identifies post-graduation goals, (2) integration of academic and vocational education with college prep courses becoming more hands-on and real-world connected while vocational classes shift from skills training to analysis and problem solving, (3) elimination of "dumbed down" general track courses and high expectations for all students, (4) integration of the classroom techniques and curriculum design with workplace and the community, and (5) report cards and student records that describe a student's range and depth of skills with a better linkage with employability.

Schools with Tech Prep eliminated the general program of study that allowed students to pick and choose courses without a focus on college or career. This general track toward high school graduation often included general mathematics and science courses with less rigorous content than the courses required for college preparation. Too often, vocational students were guided into these lower-level academic courses. Tech Prep required academic courses of equal rigor to those offered for college prep but stipulated that these courses incorporate applied learning. This knowledge application to

authentic life situations matched KERA goals to develop critical thinking and problem solving.

To assess academic achievement, Kentucky's Tech Prep evaluation examines KERA accountability tests, as well as test scores from the National Assessment of Educational Progress (NAEP), Scholastic Aptitude Test scores (SAT), and American College Test (ACT) scores. Monitoring school results on these tests indicates what is happening academically in schools that offer Tech Prep programs. Student achievement is the bottomline for educational reform. Schools applying for Tech Prep programs are encouraged to be also a part of High Schools That Work. In 1996, 40 of the 116 Kentucky schools with Tech Prep were also HSTW sites. The HSTW consortium assesses academic achievement in these schools by administering the NAEP tests to all vocational students and measures results against SREB goals for achievement in reading, mathematics, and science. Monitoring NAEP scores for these schools helps assess academic achievement for schools with Tech Prep.

Comparison of KERA test results of all high schools with Tech Prep programs compared with those of high schools not offering Tech Prep has shown similar patterns of achievement over time. However, NAEP mean scores of the 40 Kentucky Tech Prep/HSTW sites were higher than the mean score of all other HSTW sites in reading, mathematics, and science. In 1996 ten Kentucky sites exceeded the HSTW goals in all three areas of reading, mathematics, and science. SREB designated these sites as high achieving sites. In these 10 schools, comparison of the 1995 and the 1997 NAEP scores of vocational education students showed increases in mean scores: A 98% increase in

reading, 12% in mathematics, and 27% in science. Figure 4 displays Kentucky sites compared to other HSTW sites and the SREB goals.

INSERT FIGURE 4

In addition to KIRIS and NAEP test results, SAT and ACT mean scores for students in Tech Prep schools provide another means of monitoring academic progress. Only 32 Kentucky schools with Tech Prep had students who took the SAT in all three years used for comparison with the state mean score on this test: 1993-1994, 1994-1995, and 1995-1996. However, comparison of the SAT mean score for students from these 32 schools with the mean score for all schools in the state with students taking this test showed equal or better verbal and mathematics scores for Tech Prep schools in all three school years. ACT scores, however, showed a different result when comparing the state mean score with the mean score for the 54 schools offering Tech Prep that had ACT scores in all three comparison years. The ACT mean score of schools with Tech Prep were .5 less in 1993-1994, .2 less in 1994-1995, and .9 less in for 1995-1996. The ACT composite score for these 54 schools did increase over the three-year period from 19.6 to 19.8. However, the state mean score increased by .6 over the same period of time.

The national Tech Prep evaluation did not look at school test scores. However, Kentucky's high-stakes accountability system uses progress on test scores as a major determinant of school success. Therefore, it is important that the Kentucky Tech Prep evaluation monitors test scores. However, limitations must be considered when examining test scores to assess effects of programs or strategies. Comparison of schools offering the program with other schools does not account for differences among students and schools. Furthermore, multiple reform strategies in schools make it difficult to

attribute student achievement to any particular program or strategy. In spite of these limitations, analyses of multiple test results over time demonstrate whether or not student achievement is taking place.

Newmann and Wehlage (1995) compared authentic student performance for students in schools with low, average, and high levels of professional community, common curriculum, collective responsibility, and academic press. Variation in implementation levels for all four of these strategies showed impressive differences in student achievement. For example, gain for students in a high collective responsibility school was 166% of the gain of a comparable student in a low collective responsibility school (p. 37). Degree of buy-in and effort appears to make a difference in student achievement. These findings by Newmann and Wehlage are supported with Tech Prep evaluation results. Test analyses for Kentucky schools with Tech Prep show the most gains in the ten high-achieving schools that have both Tech Prep and High Schools That Work. Kentucky Department of Education consultants for Tech Prep and High Schools That Work identified multiple strategies in these high-achieving sites. Among these strategies are high expectations for all students, a focus on student learning, applied learning; an aligned curriculum, and integration of academic and vocational content ("Strategies," 1997). In addition, these schools involve students and parents in career guidance and individualized advising and have a supportive principal who is actively involved in needs assessment, curriculum, professional development, and restructuring initiatives.

Community and Work-Based Learning

KERA learning goals include individual self-sufficiency and responsible membership in family, work groups, and the community. High school restructuring aims to promote these goals through service and work-based learning, as well as program planning for post-secondary education or work. This section describes Tech Prep's contribution to these goals, as identified through the collection of Tech Prep longitudinal data.

Career Planning

According to the national evaluation report for Tech Prep (Hershey, Silverberg, Owens, & Hulsey, 1998, p. 36), Tech Prep has advanced attention to career guidance and career development activities in American high schools. Career awareness and career guidance activities are a major component of Kentucky's Tech Prep programs. Career planning contributes to an individual's capacity for self-sufficiency, a KERA learning goal. High school restructuring proposed individualized career planning. The state's new graduation requirements, effective with the graduating class of 2002, include program planning for post-secondary education and work ("Individual Graduation Plan," 1998). In addition to increasing credits to a minimum of 22 for graduation, these graduation requirements stipulate that each student will complete an individual graduation plan that incorporates emphasis on career development.

Career Awareness and Planning. Career planning is a major part of Tech Prep, beginning near the end of the eighth grade. The state Tech Prep data collection instrument asks schools to indicate which elements are part of their core Tech Prep program; i.e., part of the experience of all or almost all Tech Prep students during their

secondary education. The highest percentage of Tech Prep schools (ranging from 65% in the 1993 baseline year to 94% in 1997) requires completion of an individual student plan for courses a student intends to take at the secondary and post-secondary levels. Thus, the individual student plan required for graduation in 2002 for all high schools is already in place in schools with Tech Prep.

In the first year of Tech Prep, 73% percent of schools with Tech Prep had individual career development guidance. This percentage has increased each year; with 91% of Tech Prep coordinators reporting individual career guidance as a core component in 1997. Other Tech Prep career guidance components listed in 1997 were career awareness and development classes, 85%; workplace exposure experience, 90%; a regular schedule of instruction or training at an employer workplace, 64%; and paid employment in a position related to a Tech Prep career focus, 60%.

Tech Prep legislation encourages career guidance to help students learn about their career interests and to plan an educational program (Hershey, Silverberg, Owens, & Hulsey, 1998). Nationally, Tech Prep funds have helped promote career awareness and planning for further education and careers. Most of these schools offer these career development activities for all or most students--not just Tech Prep participants (xx). This finding is comparable to Kentucky's increased emphasis on career guidance that was stimulated through Tech Prep implementation. Many of the Tech Prep career guidance components are available to all students, not just Tech Prep students.

Service and Work-Based Learning. Each year since 1993, Kentucky Tech Prep programs have reported the number of high school Tech Prep students participating in work-related experiences, community service, and school-based work experience.

Approximately one-third of Tech Prep students participate in work-site visits annually; about 4% are assigned to a workplace mentor; and 18% shadow employed workers. During the school year, about 10% of total students enrolled work part-time in employment related to their Tech Prep career specialty, and 8% are enrolled in unpaid part-time career-related internships. About 15% are participants in school-based work experiences such as school banks, school stores, or horticulture greenhouse operations.

Community service is a recognized means of building self-esteem and motivating youth to prepare for productive citizenship (Powell, 1998; William T. Grant Foundation, 1988). Tech Prep promotes service activities within the school and school community. Kentucky Tech Prep Coordinators report that annually about 40% of the students enrolled in the Tech Prep program participate in community service activities. For example, about 7% of these students serve in peer tutoring programs within the school, and 5% serve as mentors for younger children.

How does Kentucky's work-based and service learning compare with the national Tech Prep evaluation? The national study notes that workplace learning is becoming more available but that it is not specifically for Tech Prep students and gives data for 1994 and 1995. Looking at these two years with the Kentucky data mirrors the same static or declining percentage shown by the national study. The most recent two years of Kentucky data, however, show an increase in the percentage of student participation in all of these activities. Perhaps if the national study had collected data for the past two years, these data also may have shown an increase. However, the last two years of the national Tech Prep evaluation used in-depth studies of 10 local consortia (none in Kentucky) instead of the national survey.

State funding for Tech Prep allocated by the Kentucky Legislature in the 1994-1996 biennium may have contributed to increased participation in work-based learning. The national study suggests that job shadowing, cooperative education programs for paid workplace employment, and community service programs have been developed in many communities but that these programs are generally open to all students, not just those enrolled in Tech Prep. They also propose that scarce resources for cooperative education may prohibit increases in the percentage of Tech Prep participation. This limitation does not appear to be true in Kentucky.

Demographic Tech Prep Data

Assessment of demographic characteristics of Tech Prep students looks for equitable access for special populations, a mandate of federal Tech Prep legislation. KERA calls for attention to equity and high expectations for all students.

Kentucky Tech Prep student characteristics are similar to those of total school enrollments in these schools. African Americans average about 13% of Tech Prep enrollments; this enrollment exceeds by 2-3% the percentage of African Americans in the total school population. In most years, female Tech Prep enrollment has ranged from 54% to 57%, with the 1995-1996 percentage of females dropping to 47%. The percentage of Tech Prep students who are disadvantaged averages about 41% while the percentage with disabilities is 6 to 7%.

About 70% of Kentucky school districts have Tech Prep programs. In these schools approximately 33% of the school enrollment in 1996-1997 school year were in the Tech Prep program. Tech Prep students represented 28% of total enrollment in their schools in 1993-1994, and 1994-1995. In 1995-1996, Tech Prep students represented

30% of the total school enrollment. These figures suggest a gradual percentage increase of Tech Prep students in schools that offer Tech Prep.

Nationally, about 70% of school districts are part of Tech Prep consortia. The proportions of Tech Prep special populations match the proportion in the total student population, according to the National Assessment of Vocational Education of 1994 (cited in Hershey, Silverberg, Owens, & Hulsey, 1998, p. 108). Nationally, just under half of Tech Prep students are female, about one-third economically or educationally disadvantaged, and seven percent have a disability. Whites tend to be over-represented in the national population of Tech Prep students. African Americans average about 17% of the national enrollment.

A Programmatic Model for Systemic Evaluation

Based on experience with programmatic alignment and assessment, what have we learned that can help guide school improvement? What have we learned about assessment alignment and what it means for educational leadership? In conclusion, these issues are discussed and a systemic assessment model is presented that is adaptable to different programs and innovations.

What Did We Learn?

In Kentucky state leadership and legislators, as well as local school personnel, see a good match between goals and strategies of Tech Prep and school reform. The state leadership's initial work to match Tech Prep with school reform contributed to the "fit." The $1.5 million of state funding allocated for Tech Prep since 1994 is tangible evidence of belief that Tech Prep can help achieve educational learning goals. Qualitative data from written perceptions about Tech Prep's contribution to KERA are very positive.

Emma Revis, a Tech Prep Coordinator at Taylor County High School, described her perception of how Tech Prep served as a reform change agent (personal communication, January 1998):

> Tech Prep served as the initial change agent for our high school. Tech Prep established applied learning and career planning as accepted components of the curriculum. . . . Career Choices was implemented in the middle school as a result of Tech Prep and has been very successful. Two school-based enterprises, Cardinal Kroger and Cardinal Financial Center are giving students hands-on, authentic learning experiences. Both of these were Tech Prep initiatives.

Results from the Tech Prep evaluation clearly show that it promotes collaboration of academic and vocational teachers and more applied academic knowledge. Improved career counseling and individual career planning provide a solid foundation for the new graduation requirement that all students complete an Individual Graduation Plan (IGP). Transition of students into community colleges, technical colleges, and four-year colleges and universities reflects moderate success in encouraging further education after high school. Intensified follow-up should reduce the increasing percentage of students whose status is unknown after graduation. Research and special strategies should address the 4 to 5% of students who do not enter employment or higher education upon completion of the secondary program.

Administrative support is a key factor in the success of program implementation, both at the secondary and post-secondary levels. This support is particularly important in the first two or three years of establishing a new program. The role of the principal in

providing leadership for innovations is well documented (Barkley & Castle, 1993; Gaustad, 1995).

Examination of Kentucky accountability test results, NAEP, ACT, and SAT reveal mixed results. Schools are undergoing multiple change strategies that create a complexity of inter-relatedness. This connectedness is desirable for collaboration and collective responsibility, but alignment of purposes and learning strategies make it essential to have test score analysis viewed school wide and district wide. Longitudinal test data are more meaningful for interpretation than are single-year results. Test scores are important indicators of school improvement but should be viewed as one factor in a multi-component evaluation process.

Data analyses of Tech Prep programs over the past five years support a number of effective practices that are identified in school improvement literature. Multiple efforts and strategies have the best chance to improve student achievement when there is clarity and coherence in the minds of teachers (Fullan, 1996; Newmann & Wehlage, 1995). Lee, Smith, & Croninger (1996) examined academic progress in relation to school reform practices and found that schools implementing three or more restructuring practices had significantly higher academic achievement than other schools. The improvement made in academic achievement by Kentucky schools that are Tech Prep and High Schools That Work sites suggests that programs with common goals and strategies reinforce efforts and achieve greater results. Schools that are Tech Prep/HSTW sites benefit from professional development and concerted efforts that employ a variety of strategies to achieve the same end result. These two programs match quite well. The high NAEP test scores by students in the ten high achieving sites in Kentucky support the concept of greater

achievement gain with higher degrees of reform implementation (Newmann & Wehlage, 1996). Certainly, this theory merits further research of schools with varying levels of Tech Prep implementation.

What Does It Mean for Systemic Assessment?

Kentucky's alignment of Tech Prep goals, strategies, and assessment with educational reform and restructuring illustrates how such an alignment may be structured. Schools are giving attention to lateral and horizontal alignment of school curriculum. This paper proposes an alignment of evaluation processes. This alignment contributes to a system's ability to handle evaluation of interdependent programs and learning strategies and suggests recommendations for systemic assessment.

Fullan (1996) sees the multiple innovations and myriad policies that affect schools as reducing educators' motivation to achieve or sustain reform. He urges greater coherence and redesign of interrelationships because it is people who change systems.

Teachers become motivated to move in new directions when they see that what they are working toward is beneficial for student learning and when the culture of the school encourages collaboration and cooperative effort. The purpose of assessment is to gauge how well we are accomplishing what we believe should be done. Assessment results help us celebrate achievements and make modifications to improve. With buy-in to school goals, teachers should be able to see how their part of the work of the school contributes to these goals. Alignment of programs and program assessment helps make sense of these relationships.

Figure 5 is a generic systemic assessment model to be used as a guide for alignment of programs and innovations as part of a coherent school reform—not merely a

shifting of focus from one program to another. Alignment begins with a careful match of program goals and strategies with the overall school reform. Programs may have specialized goals or strategies beyond those for the total school, but they should fall within the basic framework. Support and contributions that the program lends toward achievement of schoolwide goals and school improvement themes should be evident if the program is appropriate for students' within the school.

Give priority for data collection to items that help assess the program's contribution to overall school improvement. Sources for data should be carefully considered to avoid duplicative effort and unnecessary paperwork. Be sure that data collected enables formative evaluation as a basis for program adjustments as well as summative assessment of program performance for decisions about program longevity.

Process as well as product or outcome data are essential. To make program adjustments, we must know have a clear picture of the progress of its components. For example, if community service or work experience is a component, the degree of involvement of students in these activities must be measured. This is not a measurement of student achievement or outcomes but is a measure of component intensity—thus, process. Finally, avoid the temptation to overcomplicate and collect data on every related item. Be selective and make good choices of the most important indicators. Lay out a plan for meaningful data analysis. Do not include data without a clear plan for how it will be analyzed for assessment. Finally, use a computer database to design data files, records, and analysis reports. Collect the same data over a period of at least three to five years.

Student achievement is what schools are about and must be a part of any assessment system. Decisions must be made about how, where, and when to obtain the data. These decisions should be made based on a clear picture of what best measures for goal achievement, as well as a knowledge of data resources that may be already available.

Systemic alignment of programs and assessment sounds like a big order, and it is! The payoff, however, will be worth it. Once the design is established and implemented, regular data collection and analysis becomes simpler and more meaningful than sporadic isolated evaluation of programs and school improvement changes. Systemic alignment of data collection and evaluation promotes coherent, and collaborative effort—thus, contributing to a culture of teamwork.

What Does It Mean for Educational Leadership?

Schools are educational laboratories. New programs, new methodologies, and new delivery structures are the order of the day. Good decisions about selection of new programs can be made by examining how well the goals and strategies of these innovations mirror the school's mission and learning goals. A systematic and systemic evaluation provides information that allows frequent review and analysis of program results, as well as analysis of trends over time. A foci of assessment based on school-wide or state-wide goals promotes collaboration and keeps everyone moving in the same direction for school improvement.

Lessons learned from Kentucky's five-year assessment experience with a model that aligns a specific program with state reform can help school administrators connect goals, strategies, and assessment of various program initiatives. The model is applicable at both the state and local levels. Educational leadership at the state level sets goals,

standards, and frameworks for education and is accountable to state and federal funding agencies. Statewide assessment that aligns data collection and analysis for various programs presents a coherent picture of education and reduces duplication of effort.

At the school level, local decision makers determine school goals and strategies to improve student achievement. Research supports the need to have everyone in the school understand these goals, collectively accept responsibility, and work collaboratively to achieve them (Newmann & Wehlage, 1995; Schmoker, 1996). Programs and initiatives within the school should align with school goals, and assessment should include data that indicate whether or not these separate parts contribute to the whole. School success depends on effective selection, measurement, and adjustment (Schmoker, 1996).

Although individual programs in a school may have specialized goals and assessment items, it is important that they be consistent with the total school learning goals and instructional themes. This consistency requires not only program alignment but also alignment of data collection and evaluation.

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Table 1.
Alignment of Tech Prep Goals and Strategies with Kentucky Education Reform Goals

KERA Learning Goals	Tech Prep	Tech Prep Strategies
Students are able to use basic communications and mathematics skills for purposes and situations they will encounter throughout their lives.	Promotes mathematics, science and communications competencies through a rigorous academic curriculum with contextual work applications	Eliminate the general track and lower-level academic courses. Integrate work-related applications in academic courses or in applied academic courses
Students shall develop their abilities to apply core concepts and principles from mathematics, the sciences, the arts, the humanities, social studies, practical living, and vocational studies to what they will encounter throughout their lives.	Integrates academic and vocational-technical content at the secondary and post-secondary levels. Articulates secondary and post-secondary Tech Prep program components and curricula.	Plan curriculum jointly between academic and vocational-technical teachers and with secondary and post-secondary levels. Integrate academic concepts in vocational courses. Integrate work-related applications in academic courses.
Students shall develop their abilities to become self-sufficient individuals.	Implements career transition planning. Incorporates work ethic into the curriculum. Provides access for special populations.	Implement individual career plans, career awareness and assessment. Encourage peer tutoring of younger students and involve students in community service and student organizations. Modify curriculum and offer services for special needs students.
Students shall develop their abilities to become responsible members of a family, work group, or community, including demonstrating community service. Students shall develop their ability to think and solve problems.	Offers work-based learning to apply knowledge in the workplace. Involves parents, business and industry and the community. Plans curriculum with business and industry and emphasizes thinking and problem-solving skills.	Offer work-related experiences such as shadowing; internships; work-site visits; workplace mentors; paid, unpaid and simulated work experience; and community service activities. Include higher-order thinking skills as well as work-related problem solving.
Students shall develop their abilities to connect and integrate experiences and new knowledge from all subject-matter fields with what they have learned previously and build on past experiences to acquire new information through various media sources.	Integrates academic and vocational-technical subjects linking secondary and post-secondary education to allow students to receive an associate degree, technical certificate, or post-secondary diploma.	Require joint planning between secondary and post-secondary teachers. Provide guidance and counseling to help students see connections between school and their goals beyond high school.

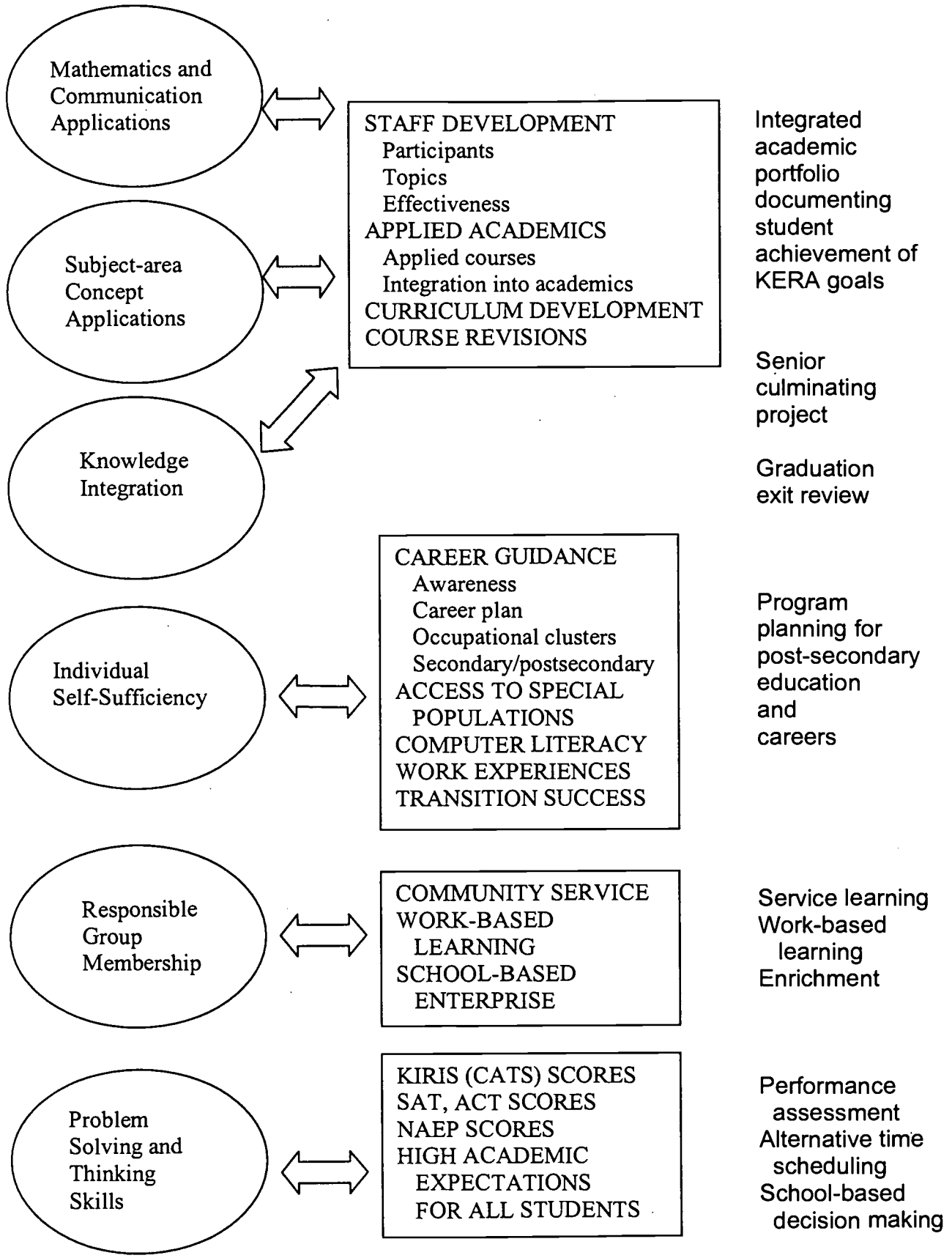

Figure 1. Alignment of Kentucky Tech Prep Evaluation, KERA Learning Goals, and High School Restructuring.

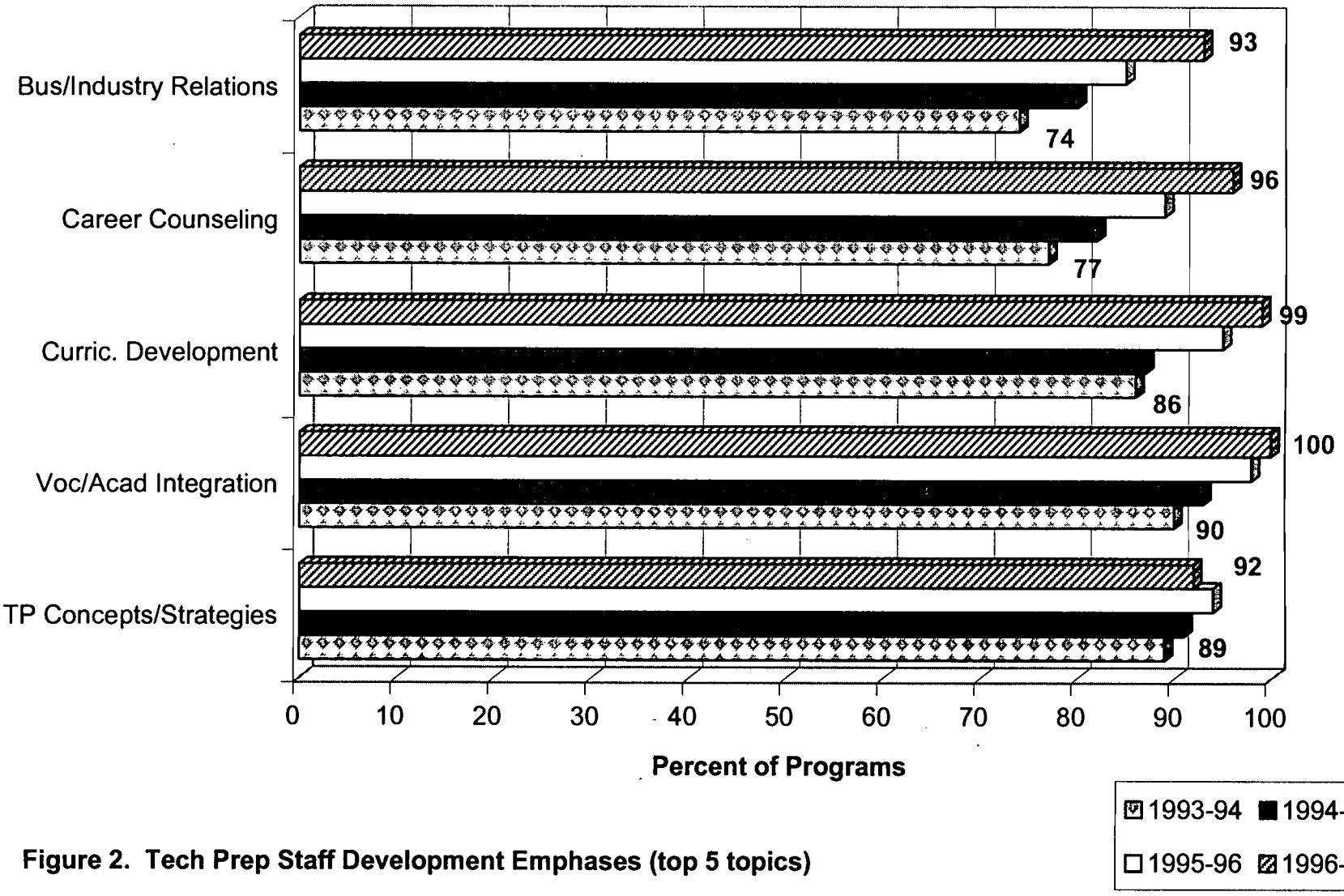

Figure 2. Tech Prep Staff Development Emphases (top 5 topics)

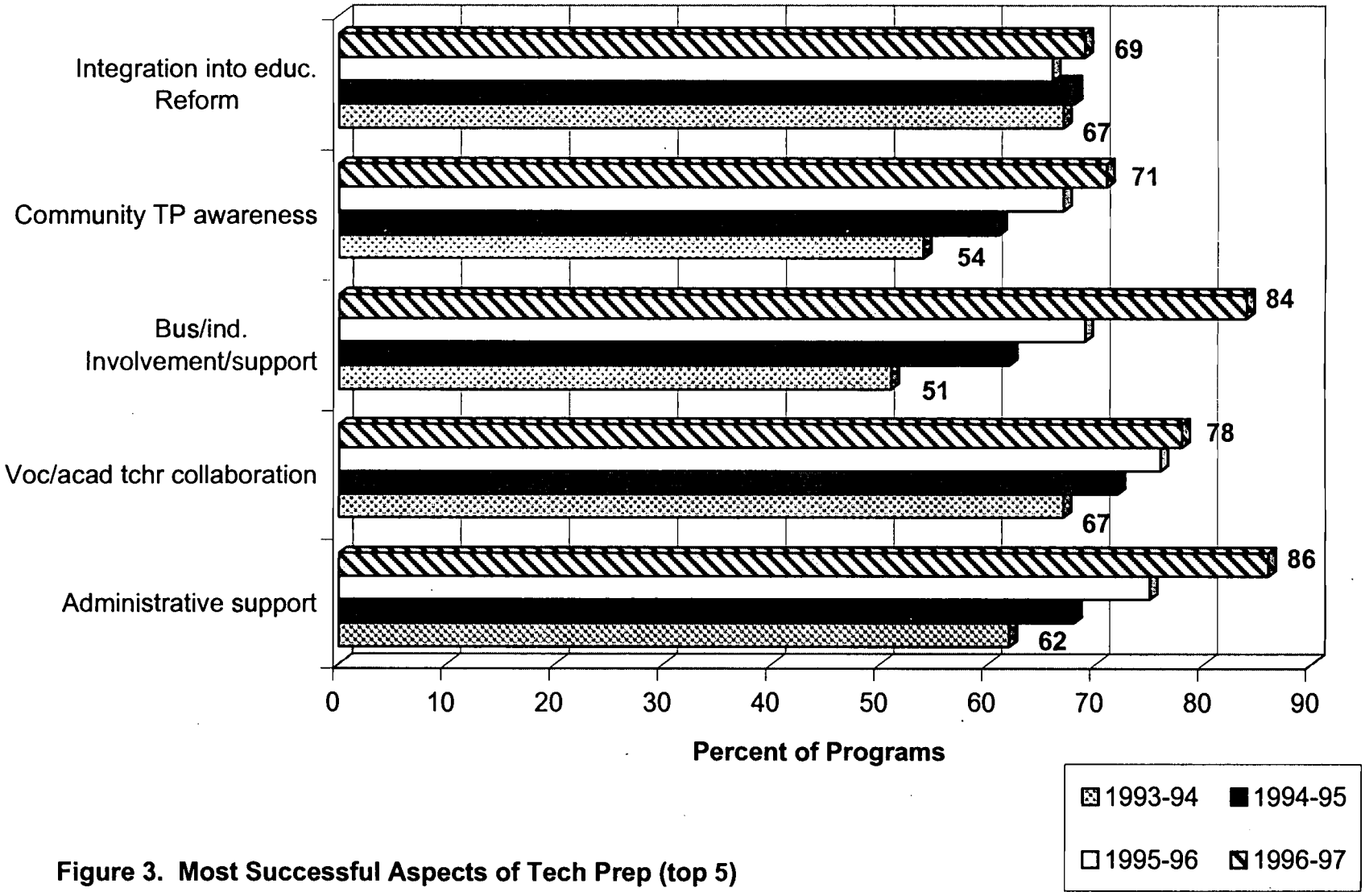

Figure 3. Most Successful Aspects of Tech Prep (top 5)

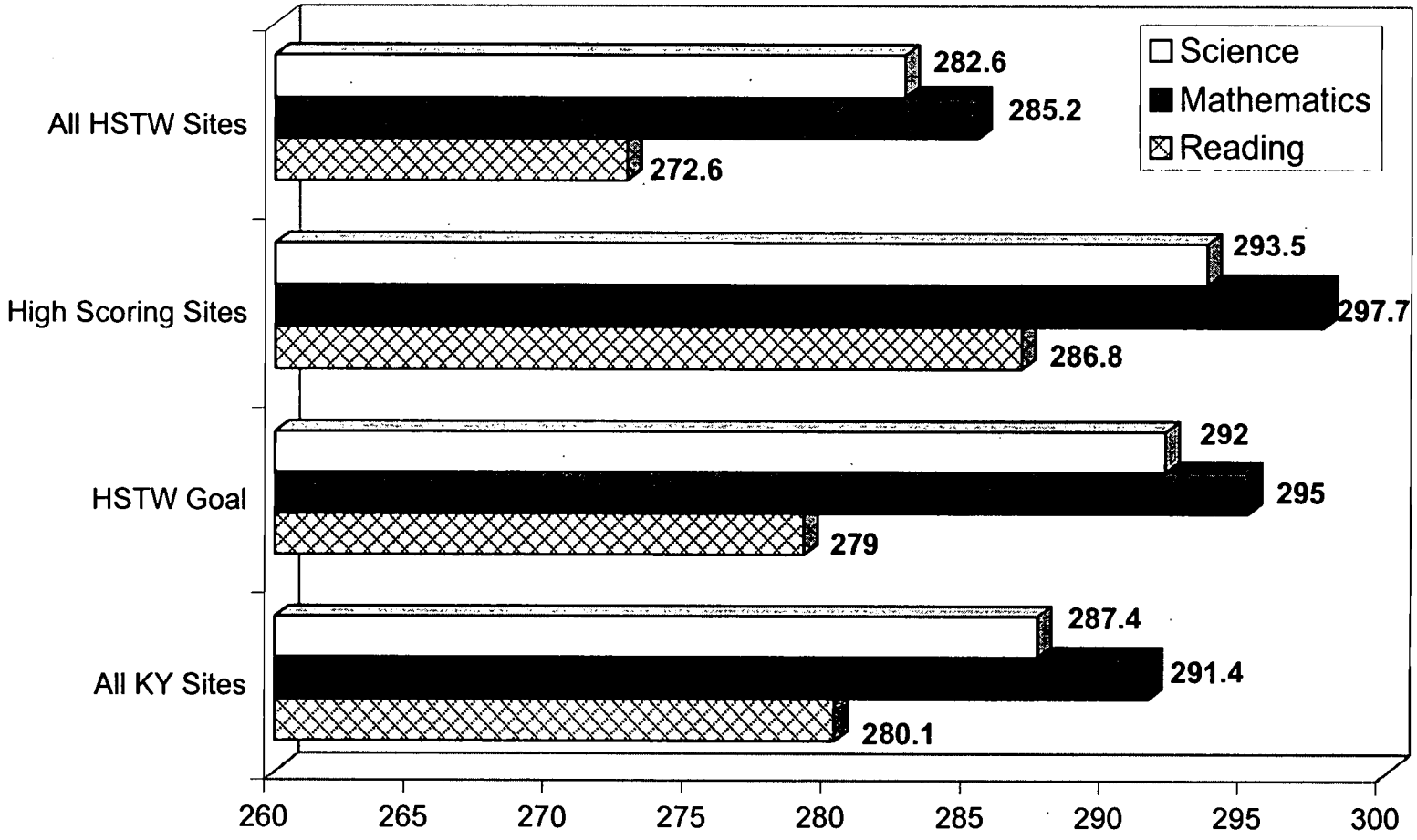

Figure 4. 40 KY Tech Prep/High Schools That Work Sites & 10 KY High Achieving Sites: 1996 NAEP Scores for High Schools That Work Sites

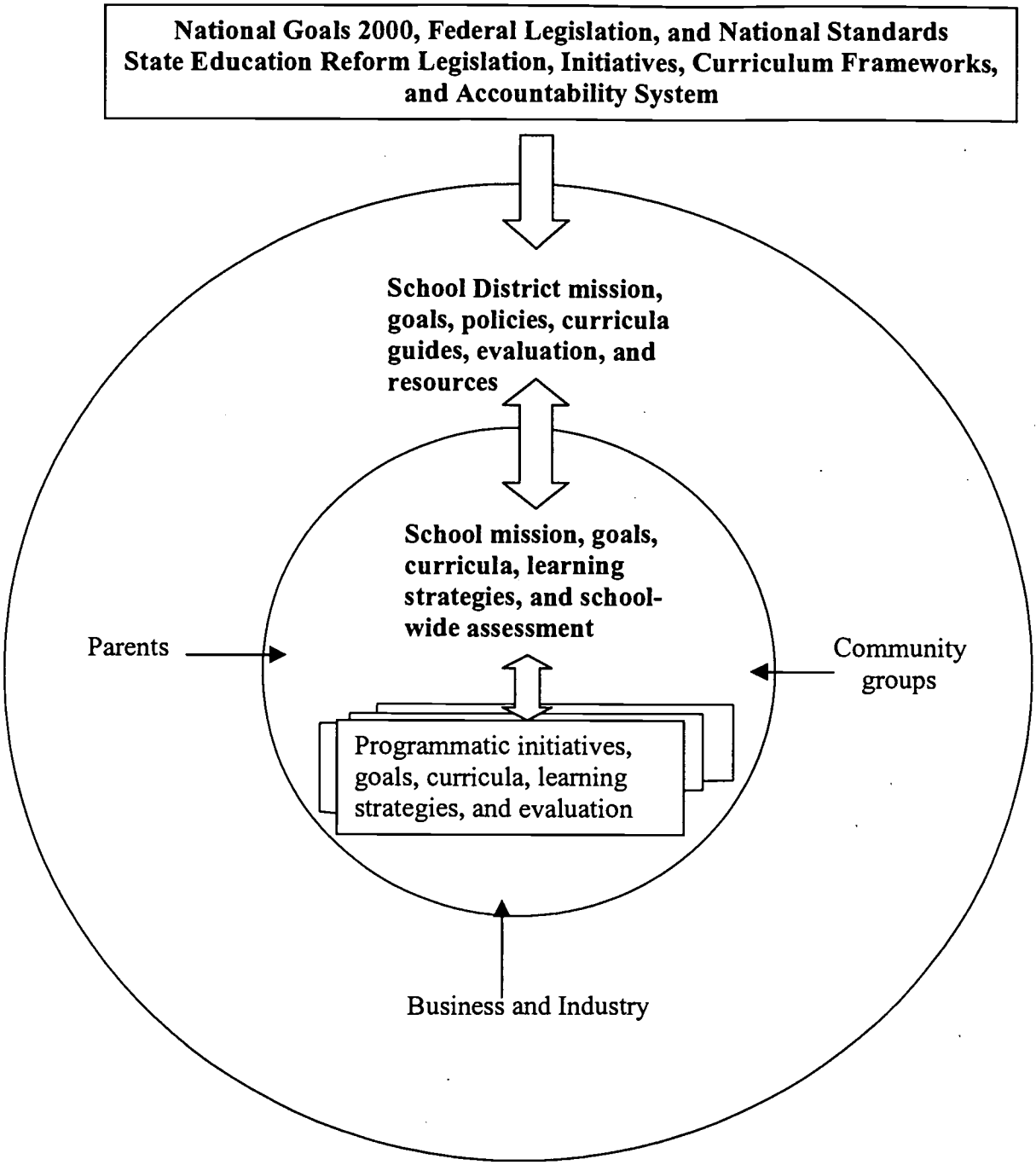

Figure 5. National, State, District, School, and Programmatic Alignment for Student Achievement.

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